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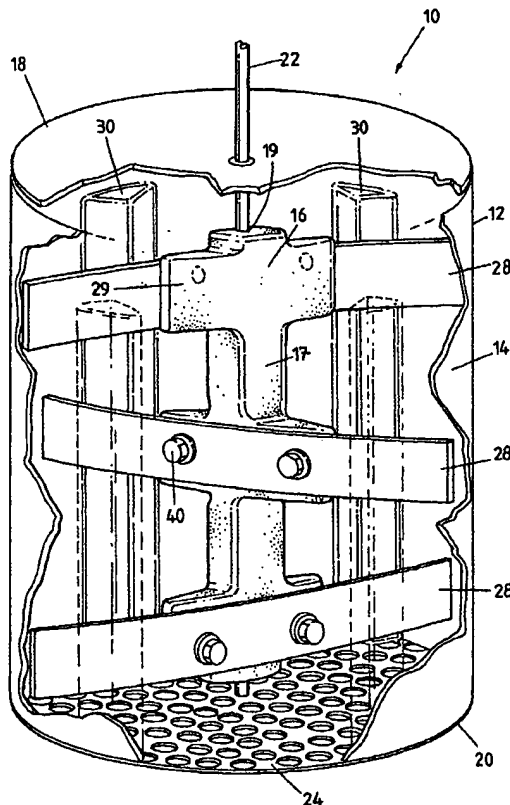
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[Continued on next page]

(54) Title: GRAIN THRESHING DEVICE



(57) Abstract: A grain threshing device (10) comprising a receptacle (12) for receiving a portion of crop head. The receptacle (12) has a plurality of longitudinal ribs (30) on inner surfaces. One or more flexible arm members (28) are arranged on a rotating shaft (22) within the receptacle (12) such that the flexible arm members (28) strike the ribs (30) during rotation. The action of the flexible arm members (28) and ribs (30) on the crop head within the receptacle (12) separates the grain from the crop head.

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"GRAIN THRESHING DEVICE"

FIELD OF THE INVENTION

5 The present invention relates to a grain threshing device.

Various types of machinery are used for the purpose of threshing grain. A known problem which many types of such machinery is that due to the mechanical arrangement of the threshing apparatus, the grain can be cracked during the threshing process.

10 Also, it is often necessary in the production of grain crops to extract small quantities of grain before harvest in order to have them tested. The testing process provides information on a range of characteristics of the grain and is used to determine the value of the crop. However, as the equipment available to extract grain is generally in the form of heavy machinery designed to extract the grain in large quantities, it is
15 therefore relatively inefficient to move this equipment between a number of crops to extract the small amount of grain required for testing purposes.

The present invention provides an improved device for threshing grain and a portable grain thresher utilising the improved device.

SUMMARY OF THE INVENTION

20 In accordance with one aspect of the present invention there is provided a grain threshing device comprising:

a receptacle arranged to receive a portion of crop head, the receptacle having a plurality of longitudinal ribs on inner surfaces thereof;

a shaft rotatably mounted within the receptacle; and

25 one or more flexible arm members extending from the shaft, the arm members being arranged to strike the longitudinal ribs upon rotation of the shaft;

wherein rotation of the shaft and the flexible arm members causes the arm members to strike the crop head in the receptacle to separate the grain from the crop head.

In accordance with a second aspect of the present invention there is provided a portable grain thresher comprising:

- 5 a portable receptacle arranged to receive a portion of crop head, the receptacle having a plurality of longitudinal ribs on inner surfaces thereof;
- a shaft rotatably mounted within the receptacle, the shaft having an end thereof engageable with a portable drive means; and
- one or more flexible arm members extending from the shaft, the arm members being
- 10 arranged to strike the longitudinal ribs upon rotation of the shaft;
- wherein the portable drive means causes rotation of the shaft and the arm members such that the arm members strike the crop head in the receptacle to separate the grain from the crop head.

BRIEF DESCRIPTION OF THE DRAWINGS

- 15 The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:
- Figure 1 is an upper perspective view of a grain threshing device in accordance with the present invention with a portion of the vessel cut away;
- Figure 2 is an upper perspective view of a portable grain thresher in accordance with
- 20 the second aspect of the present invention with a portion of the vessel cut away;
- Figure 3 is an upper perspective of an alternative embodiment of a portable grain thresher in accordance with the second aspect of the present invention with a portion of the vessel cut away; and
- Figure 4 is an exploded view of the portable grain thresher of Figure 3.

DESCRIPTION OF THE INVENTION

Referring to Figure 1, there is shown a grain threshing device 10. The grain threshing device 10 comprises a receptacle 12 in the form of a cylindrical vessel 14. The cylindrical vessel 14 includes a first end 18 through which grain crop head may be received and a suitably sized mesh 24 across an open second end 20.

The grain threshing device 10 includes a rotatably mounted shaft 22 arranged to extend along a central longitudinal axis of the cylindrical vessel 14 from the first end 18 to the second end 20.

The shaft 22 is provided with a mounting means 16 for securing a plurality of flexible arm members 28 to the shaft 22. The mounting means 16 comprises an elongate member 17 having a longitudinal bore 19 to receive the shaft 22. The elongate member 17 includes a plurality of transversely extending portions 29. The transversely extending portions 29 are arranged in pairs such that the pairs of transversely extending portions 29 extend outwardly from opposed sides of the elongate member 17. The transversely extending portions may be arranged such that each pair of transversely extending portions 29 are angularly offset from adjacent pairs of transversely extending portions 29 on the shaft 22. Each arm member 28 is secured to one of the transversely extending portions 29 such that the arm members 28 are arranged to extend transversely to the shaft member 22. The arm members 28 are in the form of flat elongate strips constructed of a flexible material such as rubber and are secured to the transversely extending portions 29 by any suitable means, such as by bolts 40 provided adjacent outer ends of the transversely extending portions 29 as shown in Figure 1.

The cylindrical vessel 14 is also provided with a plurality of inwardly protruding ribs 30. The inwardly protruding ribs 30 are arranged longitudinally at regular angular

intervals around the inner surface of the cylindrical vessel 14. The arrangement of the inwardly protruding ribs 30 and the arm members 28 is such that outer ends of the arm members 28 strike the inwardly protruding ribs 30 when the shaft 22 is rotated. The ribs 30 in the embodiment shown have a generally triangular transverse cross
5 section.

The shaft 22 is arranged to be engageable with a drive means (not shown). The drive means may be any device suitable for rotating the shaft 22.

The mesh 24 may also be removable from the cylindrical vessel 14 so that different sized mesh 24 may be used for different grain crops.

10 A collecting vessel (not shown in Figure 1) is provided below the mesh 24 to collect the separated grain.

Figures 2 to 4 show a portable threshing device 10 in accordance with the invention where like numerals denote like parts.

The cylindrical vessel 14 of the portable grain thresher 10 comprises a receptacle 12
15 which is constructed to be of a size and weight such that it can be easily carried to various locations at which a sample of crop needs to be extracted. The receptacle 12 has a removable lid 26 at the first end 18.

A first end of the shaft 22 is arranged to extend through a hole 27 provided in the lid 26, when the lid 26 is secured to the cylindrical vessel 14. The shaft 22 is rotatably
20 secured adjacent a second end thereof within a suitably sized aperture provided within the mesh 24.

The arm members 28 are secured directly to the shaft 22 in the embodiment shown in Figure 2 by securing means 29 and are angularly offset relative to each other. In the embodiment shown in Figures 3 and 4, the arm members 28 are secured to a mounting
25 means 16 mounted on the shaft 22. The mounting means 16 is in the form of a

rectangular plate member 38. The arm members 28 are secured to a surface of the rectangular plate member 38 by bolts 40.

The second end of the shaft 22 is arranged to be engageable with a portable drive means (not shown). The portable drive means may be in the form of a cordless drill.

5 The second end 20 of the cylindrical vessel 14 may also be provided with a narrowed portion 32. The narrowed portion 32 is arranged such that it may be received within a collecting vessel 36 as shown in Figure 3. The narrowed portion 32 and an upper edge of the collection vessel 36 are preferably provided with locking means 42 so that the vessel 14 may be secured to the collection vessel 36 in use.

10 In use, crop head is removed and placed into the cylindrical vessel 14. The drive means is secured to the first end of the shaft 22 and activated to rotate the shaft 22 and the flexible arm members 28. The action of the flexible arm members 28 striking the crop head and the ribs 30 act to thresh the crop head. The separated grain then falls through the mesh 24 and into the collecting vessel. Any chaff which is small enough
15 to pass through the mesh 24 can be removed by pouring the grain and chaff from the collecting vessel into a further vessel and allowing the wind to blow away the lighter chaff.

Modifications and variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention

CLAIMS

1. A grain threshing device characterised by comprising:
a receptacle arranged to receive a portion of crop head, the receptacle having a
5 plurality of longitudinal ribs on inner surfaces thereof;
a shaft rotatably mounted within the receptacle; and
one or more flexible arm members extending from the shaft, the arm members being
arranged to strike the longitudinal ribs upon rotation of the shaft;
wherein rotation of the shaft and the flexible arm members causes the arm members
10 to strike the crop head in the receptacle to separate the grain from the crop head.
2. A grain threshing device as claimed in claim 1, characterised in that the receptacle
comprises a cylindrical vessel and the shaft is rotatably mounted to extend along a
central longitudinal axis of the cylindrical vessel.
3. A grain threshing device as claimed in claim 1 or 2, characterised in that the
15 flexible arm members are arranged to extend transversely to the shaft.
4. A grain threshing device as claimed in any one of claims 1 to 3, characterised in
that flexible arm members comprise flat elongate strips wherein the distal ends of the
elongate strips are arranged to strike the ribs in use.
5. A grain threshing device as claimed in any one of the preceding claims,
20 characterised in that a removable lid is provided at a first end of the receptacle,
through which the crop head is inserted into the receptacle, and a mesh is provided
across an open second end of the receptacle, through which the threshed grain exits
the receptacle.
6. A grain threshing device as claimed in claim 5, characterised in that the mesh is
25 removable such that different mesh sizes may be used for different grain crops.

7. A grain threshing device as claimed in any one of the preceding claims, characterised in that a mounting means is provided having a longitudinal bore within which the shaft is received, the flexible arm members being secured to the mounting means.
- 5 8. A grain threshing device as claimed in claim 7, characterised in that the mounting means comprises an elongate member having a plurality of transversely extending portions extending outwardly from opposed sides of the elongate member, the flexible arm members being secured to the transversely extending portions.
9. A grain threshing device as claimed in 7, characterised in that the mounting means
- 10 comprises a rectangular plate member, the flexible arm members being secured to a surface of the rectangular plate member.
10. A grain threshing device as claimed in any one of the preceding claims, characterised in that the ribs are arranged at regular angular intervals around the inner surface of the receptacle.
- 15 11. A grain threshing device as claimed in any one of the preceding claims, characterised in that the ribs have a generally triangular transverse cross section.
12. A portable grain thresher characterised by comprising:
- a portable receptacle arranged to receive a portion of crop head, the receptacle having a plurality of longitudinal ribs on inner surfaces thereof;
- 20 a shaft rotatably mounted within the receptacle, the shaft having an end thereof engageable with a portable drive means; and
- one or more flexible arm members extending from the shaft, the arm members being arranged to strike the longitudinal ribs upon rotation of the shaft;

wherein the portable drive means causes rotation of the shaft and the arm members such that the arm members strike the crop head in the receptacle to separate the grain from the crop head.

13. A portable grain thresher as claimed in claim 12, characterised in that the
5 receptacle comprises a cylindrical vessel and the shaft is rotatably mounted to extend along a central longitudinal axis of the cylindrical vessel.

14. A portable grain thresher as claimed in claim 12 or 13, characterised in that the flexible arm members are arranged to extend transversely to the shaft.

15. A portable grain thresher as claimed in any one of claims 12 to 14, characterised
10 in that flexible arm members comprise flat elongate strips wherein the distal ends of the elongate strips are arranged to strike the ribs in use.

16. A portable grain thresher as claimed in any one claims 12 to 15, characterised in that a removable lid is provided at a first end of the receptacle, through which the crop head is inserted into the receptacle, and a mesh is provided across an open second end
15 of the receptacle, through which the threshed grain exits the receptacle.

17. A portable grain thresher as claimed in claim 16, characterised in that the mesh is removable such that different mesh sizes may be used for different grain crops.

18. A portable grain thresher as claimed in claim 16 or 17, characterised in that the shaft is rotatably secured adjacent a first end thereof within a hole in the removable lid
20 and rotatably secured adjacent a second end thereof within an aperture in the mesh.

19. A portable grain thresher as claimed in any one of claims 16 to 18, wherein the second end of the receptacle is provided with a narrowed portion, the narrowed portion being arranged to be received within a collection vessel.

20 A portable grain thresher as claimed in claim 19, wherein locking means are provided on the narrowed portion and an upper edge of the collection vessel to removably secure the receptacle to the collection vessel.

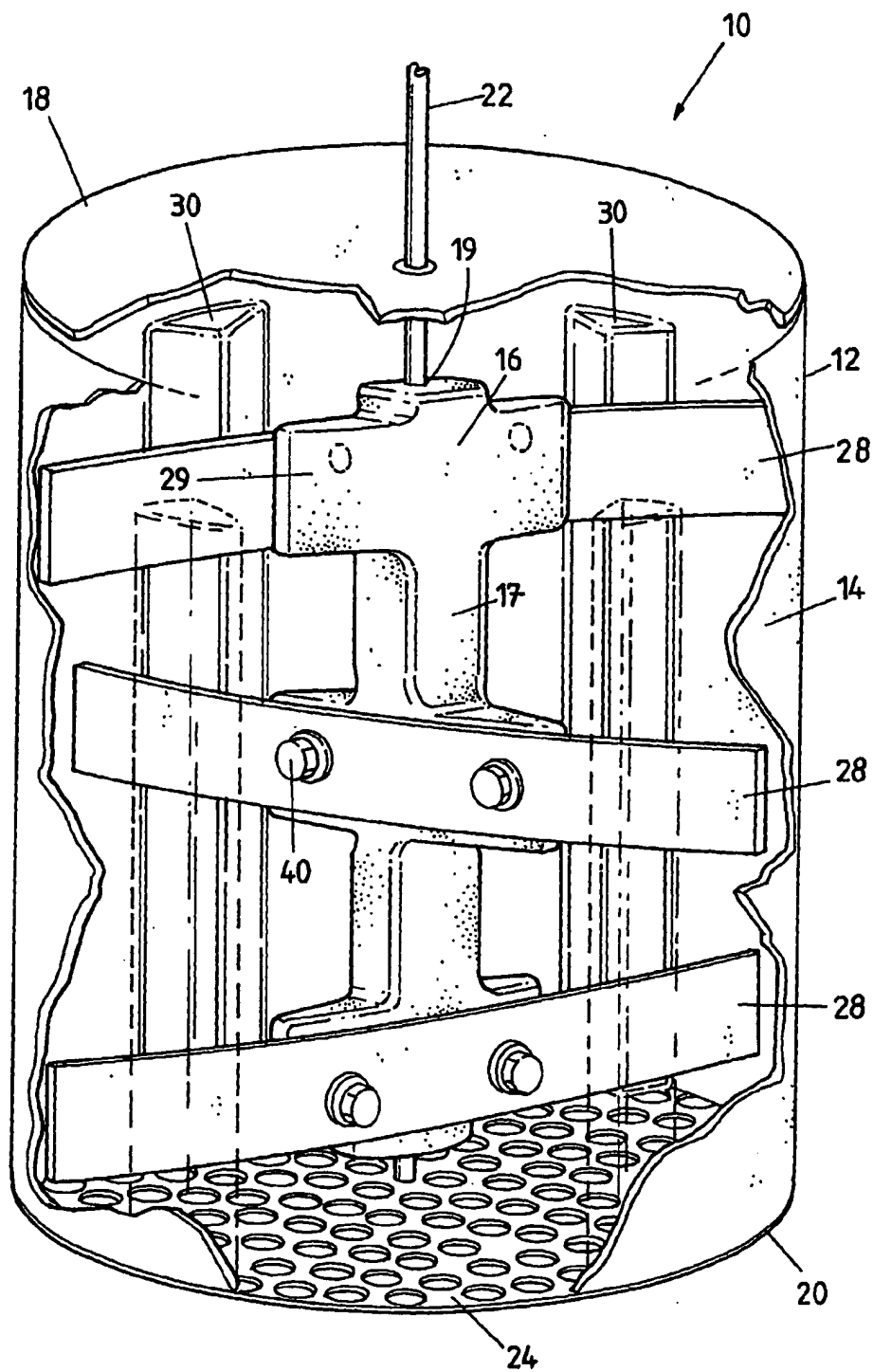
21. A portable grain thresher as claimed in any one claims 12 to 20, characterised in
5 that a mounting means is provided, the mounting means having a longitudinal bore within which the shaft is received and the flexible arm members being secured to the mounting means.

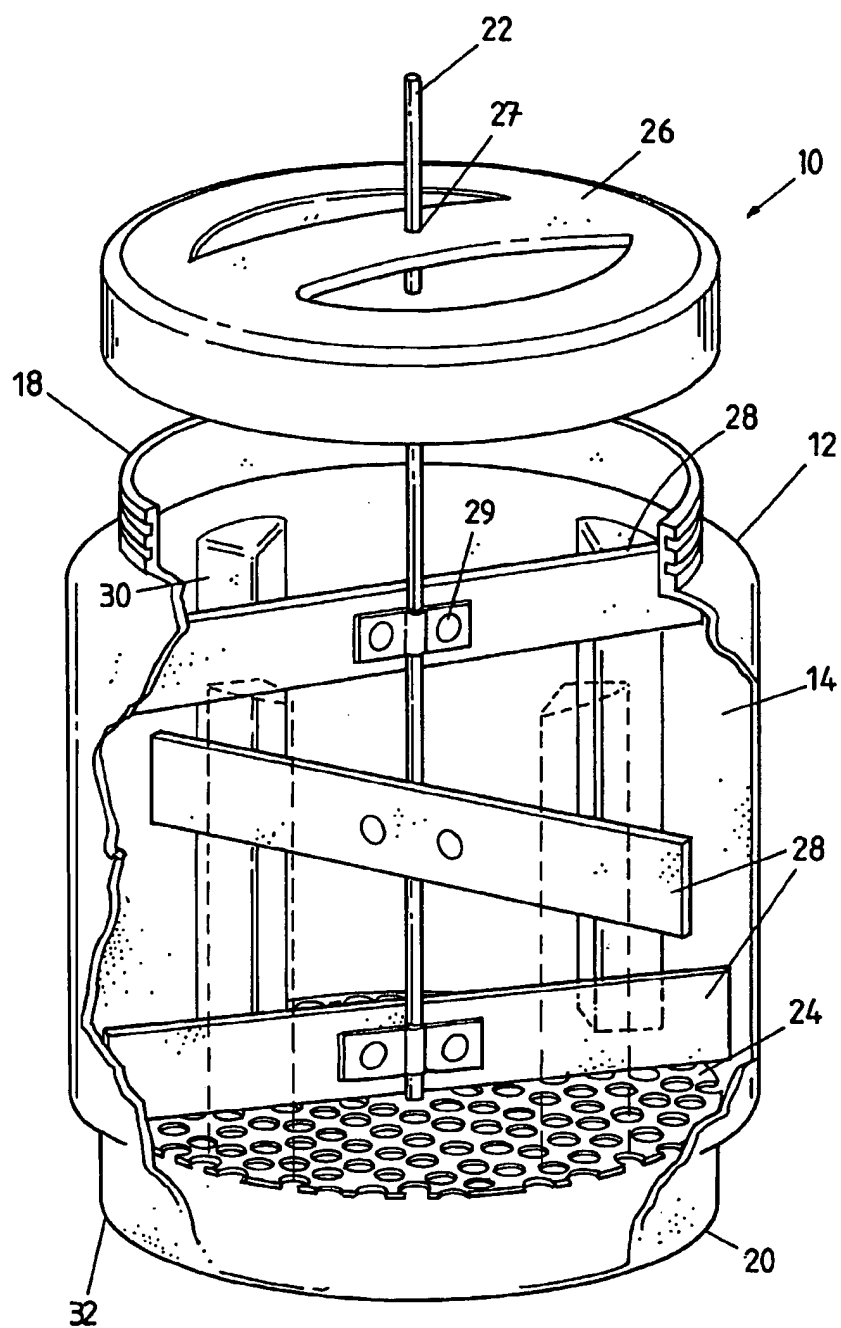
22. A portable grain thresher as claimed in claim 21, characterised in that the mounting means comprises an elongate member having a plurality of transversely
10 extending portions extending outward from opposed sides of the elongate member, the flexible arm members being secured to the transversely extending portions.

23. A portable grain thresher as claimed in 21, characterised in that the mounting means comprises a rectangular plate member, the flexible arm members being secured to a surface of the rectangular plate member.

15 24. A portable grain thresher as claimed in any one of claims 12 to 23, characterised in that the ribs are arranged at regular angular intervals around the inner surface of the receptacle.

25. A portable grain thresher as claimed in any one of claims 12 to 24, characterised in that the ribs have a generally triangular transverse cross section.

FIG.1

FIG. 2

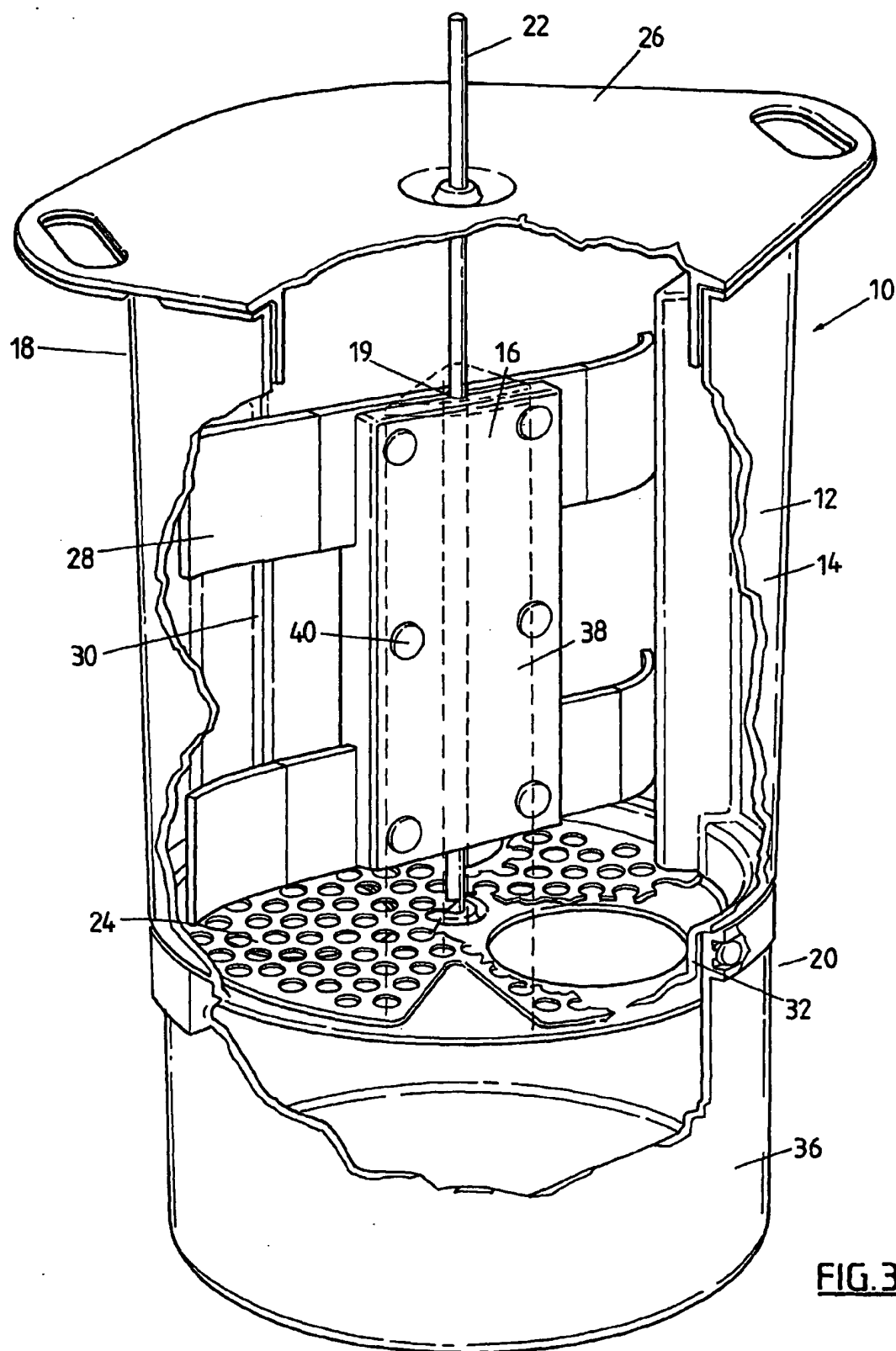


FIG. 3

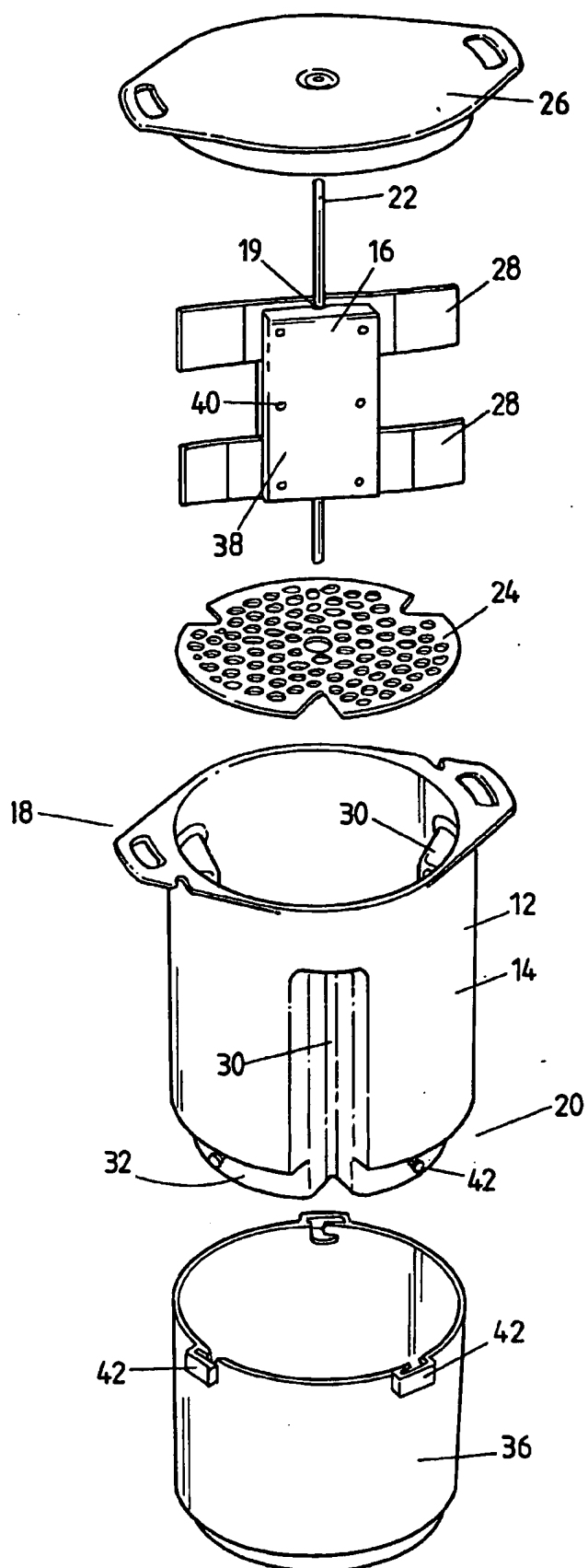


FIG.4

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER		
Int. Cl. ⁷ : A01F 12/18, 5/00, 9/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI, US databases with keywords (eg A01D/-, A01F/-, thresh, rib, vessel)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 3400252 A (ALOIS POTTINGER LANDMASCHINEN-GESELLSCHAFT mbH) 18 July 1985 Entire document	
A	US 5041058 A (QUIMBY) 20 August 1991 Entire document	
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>		
Date of the actual completion of the international search 14 February 2003		Date of mailing of the international search report 19 FEB 2003
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer A. SEN Telephone No : (02) 6283 2158

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU03/00069

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
DE	3400252	AT	4009/84
US	5041058	US	5106340
END OF ANNEX			